This key should allow you to understand why you choose the option you did (beyond just getting a question right or wrong). More instructions on how to use this key can be found here.

If you have a suggestion to make the keys better, please fill out the short survey here.

Note: This key is auto-generated and may contain issues and/or errors. The keys are reviewed after each exam to ensure grading is done accurately. If there are issues (like duplicate options), they are noted in the offline gradebook. The keys are a work-in-progress to give students as many resources to improve as possible.

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1. Find the inverse of the function below. Then, evaluate the inverse at $x = 7$ and choose the interval that $f^-1(7)$ belongs to.

$$f(x) = \ln(x - 5) + 3$$

The solution is $f^{-1}(7) = 59.598$, which is option C.

A. $f^{-1}(7) \in [162751.79, 162762.79]$

This solution corresponds to distractor 2.

B. $f^{-1}(7) \in [45.6, 50.6]$

This solution corresponds to distractor 3.

C. $f^{-1}(7) \in [55.6, 61.6]$

This is the solution.

D. $f^{-1}(7) \in [9.39, 11.39]$

This solution corresponds to distractor 4.

E. $f^{-1}(7) \in [22030.47, 22034.47]$

This solution corresponds to distractor 1.

General Comment: Natural log and exponential functions always have an inverse. Once you switch the x and y, use the conversion $e^y = x \leftrightarrow y = \ln(x)$.

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2. Multiply the following functions, then choose the domain of the resulting function from the list below.

$$f(x) = \frac{4}{4x - 19} \text{ and } g(x) = \frac{2}{6x - 29}$$

The solution is The domain is all Real numbers except $x = 4.75$ and $x = 4.83$, which is option D.

A. The domain is all Real numbers greater than or equal to $x = a,$ where $a \in [-8.67, -3.67]$

B. The domain is all Real numbers less than or equal to $x = a,$ where $a \in [2, 8]$

C. The domain is all Real numbers except $x = a,$ where $a \in [-9.2, -2.2]$

D. The domain is all Real numbers except $x = a$ and $x = b,$ where $a \in [-0.25, 8.75]$ and $b \in [2.83, 6.83]$

E. The domain is all Real numbers.

General Comment: The new domain is the intersection of the previous domains.

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3. Find the inverse of the function below (if it exists). Then, evaluate the inverse at $x = -11$ and choose the interval that $f^-1(-11)$ belongs to.

$$f(x) = \sqrt[3]{2x - 3}$$

The solution is -664.0, which is option B.

A. $f^{-1}(-11) \in [661.2, 664.3]$

This solution corresponds to distractor 2.

B. $f^{-1}(-11) \in [-666.5, -663.8]$

* This is the correct solution.

C. $f^{-1}(-11) \in [-668.5, -665]$

Distractor 1: This corresponds to

D. $f^{-1}(-11) \in [666.6, 669.2]$

This solution corresponds to distractor 3.

E. The function is not invertible for all Real numbers.

This solution corresponds to distractor 4.

General Comment: Be sure you check that the function is 1-1 before trying to find the inverse!

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4. Subtract the following functions, then choose the domain of the resulting function from the list below.

$$f(x) = \frac{3}{4x - 17} \text{ and } g(x) = \frac{5}{5x + 34}$$

The solution is The domain is all Real numbers except $x = 4.25$ and $x = -6.8$, which is option D.

A. The domain is all Real numbers greater than or equal to $x = a$, where $a \in [0.67, 10.67]$

B. The domain is all Real numbers less than or equal to $x = a$, where $a \in [0.5, 7.5]$

C. The domain is all Real numbers except $x = a$, where $a \in [-6.6, -1.6]$

D. The domain is all Real numbers except $x = a$ and $x = b$, where $a \in [2.25, 11.25]$ and $b \in [-9.8, -4.8]$

E. The domain is all Real numbers.

General Comment: The new domain is the intersection of the previous domains.

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5. Choose the interval below that f composed with g at $x = -1$ is in.

$$f(x) = 4x^3 - 2x^2 - 3x + 1 \text{ and } g(x) = -3x^3 - 4x^2 + 4x + 4$$

The solution is -2.0, which is option D.

A. $(f \circ g)(-1) \in [2.9, 5.2]$

Distractor 1: Corresponds to reversing the composition.

B. $(f \circ g)(-1) \in [-13.3, -11.7]$

Distractor 2: Corresponds to being slightly off from the solution.

C. $(f \circ g)(-1) \in [-9.3, -5.2]$

Distractor 3: Corresponds to being slightly off from the solution.

D. $(f \circ g)(-1) \in [-3.7, 1.5]$

* This is the correct solution

E. It is not possible to compose the two functions.

General Comment: f composed with g at x means $f(g(x))$. The order matters!

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6. Choose the interval below that f composed with g at $x = 1$ is in.

$$f(x) = 4x^3 - 3x^2 - 4x \text{ and } g(x) = x^3 - 2x^2 - x$$

The solution is -36.0, which is option A.

A. $(f \circ g)(1) \in [-37, -33.6]$

* This is the correct solution

B. $(f \circ g)(1) \in [-43.1, -38.7]$

Distractor 1: Corresponds to reversing the composition.

C. $(f \circ g)(1) \in [-35.4, -32.2]$

Distractor 3: Corresponds to being slightly off from the solution.

D. $(f \circ g)(1) \in [-46.5, -43]$

Distractor 2: Corresponds to being slightly off from the solution.

E. It is not possible to compose the two functions.

General Comment: f composed with g at x means $f(g(x))$. The order matters!

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7. Determine whether the function below is 1-1.

$$f(x) = -18x^2 + 30x + 408$$

The solution is no, which is option A.

A. No, because there is a y-value that goes to 2 different x-values.

* This is the solution.

B. No, because there is an x-value that goes to 2 different y-values.

Corresponds to the Vertical Line test, which checks if an expression is a function.

C. No, because the domain of the function is not $(-\infty, \infty)$.

Corresponds to believing 1-1 means the domain is all Real numbers.

D. No, because the range of the function is not $(-\infty, \infty)$.

Corresponds to believing 1-1 means the range is all Real numbers.

E. Yes, the function is 1-1.

Corresponds to believing the function passes the Horizontal Line test.

General Comment: There are only two valid options: The function is 1-1 OR No because there is a y-value that goes to 2 different x-values.

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8. Determine whether the function below is 1-1.

$$f(x) = -18x^2 - 27x + 551$$

The solution is no, which is option C.

A. Yes, the function is 1-1.

Corresponds to believing the function passes the Horizontal Line test.

B. No, because there is an x-value that goes to 2 different y-values.

Corresponds to the Vertical Line test, which checks if an expression is a function.

C. No, because there is a y-value that goes to 2 different x-values.

* This is the solution.

D. No, because the range of the function is not $(-\infty, \infty)$.

Corresponds to believing 1-1 means the range is all Real numbers.

E. No, because the domain of the function is not $(-\infty, \infty)$.

Corresponds to believing 1-1 means the domain is all Real numbers.

General Comment: There are only two valid options: The function is 1-1 OR No because there is a y-value that goes to 2 different x-values.

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9. Find the inverse of the function below. Then, evaluate the inverse at $x = 9$ and choose the interval that $f^-1(9)$ belongs to.

$$f(x) = \ln(x-5) - 2$$

The solution is $f^{-1}(9) = 59879.142$, which is option E.

A. $f^{-1}(9) \in [1099.63, 1108.63]$

This solution corresponds to distractor 1.

B. $f^{-1}(9) \in [59866.14, 59873.14]$

This solution corresponds to distractor 3.

C. $f^{-1}(9) \in [51.6, 54.6]$

This solution corresponds to distractor 4.

D. $f^{-1}(9) \in [1202602.28, 1202607.28]$

This solution corresponds to distractor 2.

E. $f^{-1}(9) \in [59877.14, 59881.14]$

This is the solution.

General Comment: Natural log and exponential functions always have an inverse. Once you switch the x and y, use the conversion $e^y = x \leftrightarrow y = \ln(x)$.

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10. Find the inverse of the function below (if it exists). Then, evaluate the inverse at $x = -13$ and choose the interval that $f^-1(-13)$ belongs to.

$$f(x) = \sqrt[3]{5x-3}$$

The solution is -438.8, which is option B.

A. $f^{-1}(-13) \in [439.58, 440.16]$

This solution corresponds to distractor 3.

B. $f^{-1}(-13) \in [-439.47, -438.01]$

* This is the correct solution.

C. $f^{-1}(-13) \in [438.07, 439.06]$

This solution corresponds to distractor 2.

D. $f^{-1}(-13) \in [-441.24, -439.27]$

Distractor 1: This corresponds to

E. The function is not invertible for all Real numbers.

This solution corresponds to distractor 4.

General Comment: Be sure you check that the function is 1-1 before trying to find the inverse!